Trend Study 28-6-03

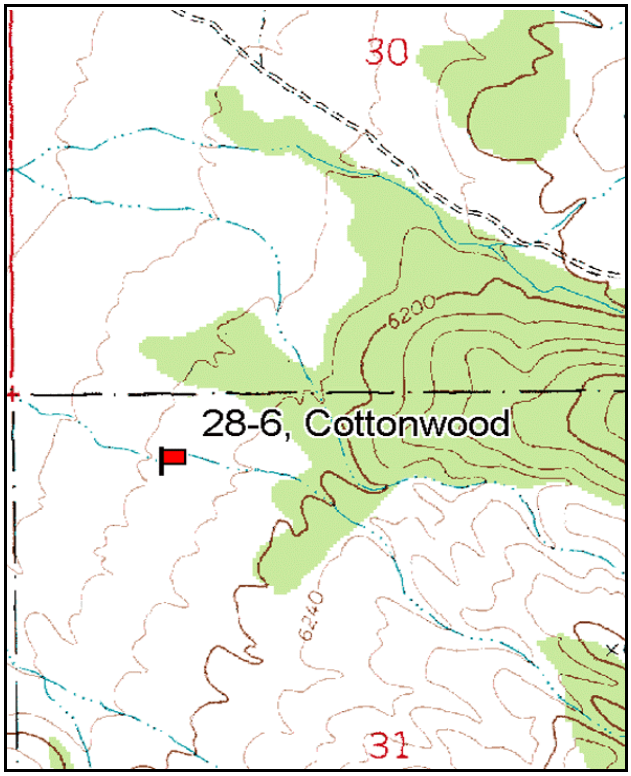
Study site name: Cottonwood . Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft). Rebar: belt 1 on 2ft, belt 3 on 2ft.

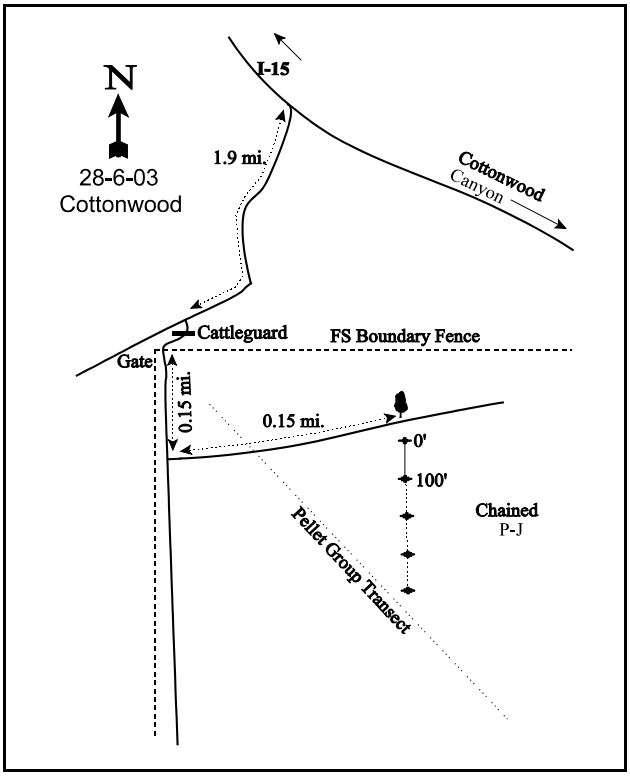
LOCATION DESCRIPTION

From the intersection of SR 20 and the frontage road along the east side of I-15, travel south down the frontage road 6.6 miles to a gate on the left. Go through the gate and travel east for 1.9 miles to a cattleguard on the right. From the cattleguard, go 0.15 miles south along the fence. Turn left on an old road going up into the chaining. Continue 0.15 miles to the study site on the south side of the road. Stop next to a large pinyon. From large pinyon, walk 75 feet at 130 degrees magnetic. The 0-foot baseline stake is 20 feet south of the road. This 2 foot tall fencepost is marked with a browse tag #9006.



Map Name: Cottonwood Mountain

Township 32S , Range 7W , Section 31



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4205113 N, 351067 E

DISCUSSION

Cottonwood - Trend Study No. 28-6

This trend study is located on critical deer winter range west of the Hurricane Cliffs and samples a sagebrush area at the mouth of Cottonwood Canyon. The site is just above the Forest Service boundary fence at an elevation of 6,100 feet. Slope is 2-3% with a westerly aspect. The area is part of a large chaining project completed in 1970. The site is now dominated by a Wyoming big sagebrush-grass type with few pinyon or juniper trees being present. In 1992, deer sign was abundant including antler drops, pellet groups, and a carcass. A pellet group transect read on site in 1998 estimated 41 deer, 7 elk, and 2 cow days use/acre (101 ddu/ha, 17 edu/ha, and 5 cdu/ha). Pellet group transect data collected in 2003 estimated 60 deer, 3 elk, and 5 cow days use/acre (149 ddu/ha, 7 edu/ha, and 13 cdu/ha) on the site.

The soil is light brown in color with an average effective rooting depth of almost 15 inches. Textural and chemical analysis indicates a sandy loam with a slightly alkaline pH (7.5). Soil temperature averaged almost 69°F at a depth of 15 inches in 2003. Several gullies are found crossing the site, but do not appear to be very active. Some erosion is occurring on the site, but overall it is not severe. An erosion condition class assessment completed on site in 2003 resulted in a slightly eroding rating. Evidence of erosion came in several categories including surface litter movement, pedestalling, flow patterns, and rill formation. Bare ground has been moderate since 1992 ranging between 21-26% with most bare soil occurring in the shrub interspaces.

Wyoming big sagebrush is the only browse species of worth on the site. The sagebrush density appears to have stabilized at about 1,600 plants/acre in 2003 after having declined in 1992 and 1998. Utilization was very high in 1987 when 89% of the sagebrush sampled displayed heavy hedging (>60% of twigs browsed). Use declined to a more moderate level in 1992 and 1998, but again was moderate to heavy in 2003. Plants displaying poor vigor has been steady since 1992 ranging from 13-17%. The population has steadily become more decadent with each reading. Decadence was low in 1987 at 8%, peaking at 49% in 2003. The number of young in the population has steadily declined with each reading, and was numbered at only 20 plants/acre in 2003. Furthermore, 28% (220 plants/acre) of the decadent age class was classified as dying in 2003, and with low reproduction, the population could decline by the next assessment. Annual sagebrush leaders averaged 1.6 inches of growth when the site was read in mid-June 2003. The only other browse encountered on the site include a few prickly phlox and prickly pear cactus. Mature stands of pinyon-juniper to the north provide thermal cover. On the site itself, there are only scattered mature trees and a few young ones.

For a chained and seeded site, perennial herbaceous vegetation is limited. In 1987, crested wheatgrass was the most frequently encountered perennial grass being sampled in 18 of the 100 quadrats, while all other perennial grasses were sampled in 8 quadrats or less. Crested wheatgrass has slowly declined in nested and quadrat frequencies since 1987 while the warm season increaser, purple three-awn, has increased and become the most abundant perennial grass on the site. Crested wheatgrass is primarily found underneath sagebrush plants, the result of selective livestock grazing since the chaining and seeding treatment. Although annual species were not sampled in 1987, photographs from that year show that cheatgrass was moderately abundant. In 1992 and 1998, cheatgrass significantly increased in nested frequency and was the dominant species in the understory being sampled in all of the quadrats in 1998. With drought in 2003, cheatgrass had a drastic decline in frequency and cover and was sampled in only 18 quadrats, and it's nested frequency value declined 88%. The forb component has poor composition and diversity. The only common perennial forb is scarlet globemallow which is a desirable species that has maintained a stable frequency since 1992.

1987 APPARENT TREND ASSESSMENT

A concentration of rocks and pavement occurs on the soil surface constituting 23% of the ground cover for the area. Vegetative cover is low and litter cover quite high (64%), most of which is provided by the annual cheatgrass. Although of rather poor quality, ground cover of some kind occurs on all but 9% of the surface. Browse trend appears slightly down due to the degree of heavy hedging and lack of seedlings for sagebrush. The herbaceous understory is dominated by ephemeral plants. Perennial forbs are lacking.

1992 TREND ASSESSMENT

Soil conditions appear similar to those of 1987. Using the new cover estimation procedure, rock and pavement cover increased to 31%, litter declined to 26%, while percent bare ground cover increased to 21%. Some of these changes are the result of the new, much larger sampling design. Little erosion occurs on this site due to the nearly continuous cover of rock and pavement. In addition, dead cheatgrass plants provide abundant cover. Trend for soil is slightly down. Wyoming big sagebrush, the only abundant browse species on the site, declined in density since 1987, but this is more reflective of the larger sampling design than any real change in it's density. Percent decadence doubled but is still relatively low at only 16%. The proportion of heavily hedged plants declined from 89% to 14%. Plants were very vigorous this year, producing abundant seed. Overall trend for browse is stable. Nested frequencies for perennial grasses increased while those for forbs declined. Nested frequencies for perennial grasses and forbs combined, remained basically unchanged. Annual grasses and forbs dominate the herbaceous understory. Cheatgrass accounts for 45% of the herbaceous understory cover. Trend for herbaceous understory is stable.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - stable (3)

1998 TREND ASSESSMENT

The soil trend is slightly upward. Even though percent vegetative cover increased, most of the increase is due to cheatgrass. Although cheatgrass does provide some soil protection, it is not as effective at protecting the soil from overland flow as perennial grasses or forbs. Percent bare ground cover increased slightly while percent rock and pavement cover combined decreased. Erosion is currently minimal, although there are several gullies crossing the site. The browse trend is stable. Although percent decadence for Wyoming big sagebrush has increased since 1987 and 1992, there are currently enough seedling plants to make up for the losses. It is a little surprising that any seedling plants were encountered in 1998 considering the abundance of cheatgrass. If cheatgrass abundance continues to increase, it will be difficult for seedlings to establish and the possibility of losing the browse population due to a fire event increases. The herbaceous understory is slightly downward. Perennial grasses, although sparse, are still present throughout the site with a slight increase in sum of nested frequency since 1992. The problem lies with cheatgrass. Nested frequency has significantly increased since 1992. The wet spring of 1998 produced high cheatgrass cover values and ample seed for future years.

TREND ASSESSMENT
soil - slightly up (4)
browse - stable (3)
herbaceous understory - slightly down (2)

2003 TREND ASSESSMENT

Trend for soil is slightly down. Vegetation and litter cover both show declines which is due to the drastic decrease in cheatgrass with drought conditions prior to and including the 2003 sampling period. Bare ground only slightly increased in 2003. Although erosion is evident on the site, it is not severe. Soils were rated as slightly eroding in 2003 partly due to the formation of rills on the soil surface as well as moderate pedestalling. Trend for browse is slightly down. The Wyoming big sagebrush population shows increased decadence, less young in the population, and increased heavy use. There are now more decadent, dying plants in the population than young to replace them, but the current level is not excessive. Overall, sagebrush density remained stable in 2003. Trend for the herbaceous understory is stable. Although the sum of nested frequency of perennial grasses has declined since 1998, cheatgrass significantly declined in cover and frequency which is a positive sign. Cool season grasses show declines in frequency while purple three-awn, a warm season species, remained stable. Perennial forbs are stable in frequency, and doubled in cover in 2003.

TREND ASSESSMENT
soil - slightly down (2)
browse - slightly down (2)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Management unit 28 , Study no: 6

Type	Species	Nested Frequency				Average Cover %		
		'87	'92	'98	'03	'92	'98	'03
G	Agropyron cristatum	$_{b}$35	$_{ab}$22	$_{ab}$25	$_{a}$18	.88	.97	.61
G	Aristida purpurea	$_{a}$8	$_{b}$53	$_{bc}$75	$_{c}$74	3.02	4.52	2.42
G	Bouteloua gracilis	3	-	-	-	-	-	-
G	Bromus tectorum (a)	-	$_{b}$302	$_{c}$367	$_{a}$44	8.19	17.91	.33
G	Oryzopsis hymenoides	8	6	8	2	.07	.10	.03
G	Poa secunda	-	-	1	1	-	.03	.00
G	Sitanion hystrix	$_{a}$11	$_{b}$46	$_{b}$44	$_{a}$16	.93	.86	.19
G	Sporobolus cryptandrus	3	-	3	-	-	.00	.00
G	Stipa comata	$_{ab}$6	$_{a}$6	$_{b}$19	$_{ab}$12	.21	.43	.19
Total for Annual Grasses		0	302	367	44	8.19	17.91	0.33
Total for Perennial Grasses		74	133	175	123	5.12	6.92	3.46
Total for Grasses		74	435	542	167	13.32	24.84	3.80
F	Ambrosia spp.	-	5	-	-	.01	-	-
F	Astragalus panguicensis	2	-	-	-	-	-	-
F	Chaenactis douglasii	-	-	1	-	-	.00	-
F	Chenopodium fremontii (a)	-	3	-	1	.00	-	.00
F	Descurainia pinnata (a)	-	$_{b}$42	$_{a}$-	$_{a}$1	1.47	-	.00
F	Eriogonum cernuum (a)	-	6	-	-	.04	-	-
F	Erigeron spp.	-	-	2	-	-	.01	-
F	Euphorbia fendleri	$_{b}$90	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-

Type	Species	Nested Frequency				Average Cover %		
		'87	'92	'98	'03	'92	'98	'03
F	Gilia spp. (a)	-	$_{c}$112	$_{a}$-	$_{b}$27	.66	-	.47
F	Ipomopsis aggregata	-	3	-	-	.00	-	-
F	Phlox longifolia	-	-	-	6	-	-	.15
F	Polygonum spp.	-	3	-	-	.01	-	-
F	Senecio multilobatus	-	2	-	-	.00	-	-
F	Sphaeralcea coccinea	$_{a}$71	$_{b}$103	$_{b}$125	$_{b}$130	2.59	2.29	4.25
Total for Annual Forbs		0	163	0	29	2.18	0	0.48
Total for Perennial Forbs		163	116	128	136	2.62	2.31	4.40
Total for Forbs		163	279	128	165	4.81	2.31	4.89

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 28 , Study no: 6

Type	Species	Average Cover %		
		'92	'98	'03
B	Artemisia tridentata wyomingensis	9.88	7.56	12.17
B	Leptodactylon pungens	.15	.03	-
B	Opuntia spp.	.00	-	-
B	Pinus edulis	-	-	-
Total for Browse		10.03	7.59	12.17

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 28 , Study no: 6

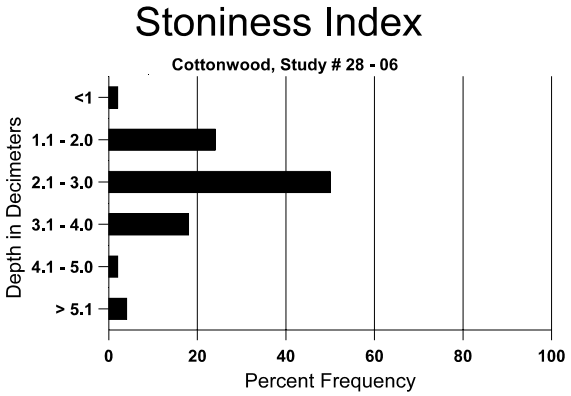
Species	Average leader growth (in)
	'03
Artemisia tridentata wyomingensis	1.6

BASIC COVER --
Management unit 28 , Study no: 6

Cover Type	Average Cover %			
	'87	'92	'98	'03
Vegetation	3.25	24.97	34.35	22.39
Rock	12.75	5.65	4.45	5.30
Pavement	10.50	24.90	16.75	30.56
Litter	64.25	25.82	38.24	28.77
Cryptogams	0	.01	.24	.10
Bare Ground	9.25	21.09	23.68	26.27

SOIL ANALYSIS DATA --
Management unit 28, Study no: 6, Study Name: Cottonwood

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
14.8	68.8 (15.0)	7.5	61.4	20.4	18.2	1.3	7.8	147.2	0.5



PELLET GROUP DATA --
Management unit 28 , Study no: 6

Type	Quadrat Frequency		
	'92	'98	'03
Rabbit	61	38	35
Elk	-	1	-
Deer	57	47	28
Cattle	2	-	2

Days use per acre (ha)	
'98	'03
-	-
7 (17)	3 (7)
41 (101)	60 (149)
2 (5)	5 (13)

BROWSE CHARACTERISTICS --
Management unit 28 , Study no: 6

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis											
87	**2466**	-	466	1800	200	-	11	89	8	3	23/29
92	**1920**	-	120	1500	300	-	57	14	16	14	-/-
98	**1560**	140	100	1000	460	340	64	6	29	13	26/37
03	**1620**	-	20	800	800	280	37	42	49	17	27/35
Juniperus osteosperma											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	20	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Leptodactylon pungens											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**60**	-	-	60	-	-	0	0	-	0	-/-
98	**20**	-	-	20	-	-	0	0	-	0	3/10
03	**20**	-	-	20	-	-	0	0	-	0	6/5
Opuntia spp.											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**40**	20	20	20	-	-	0	0	-	0	-/-
98	**20**	-	-	20	-	-	0	0	-	0	5/9
03	**20**	-	20	-	-	-	0	0	-	0	-/-